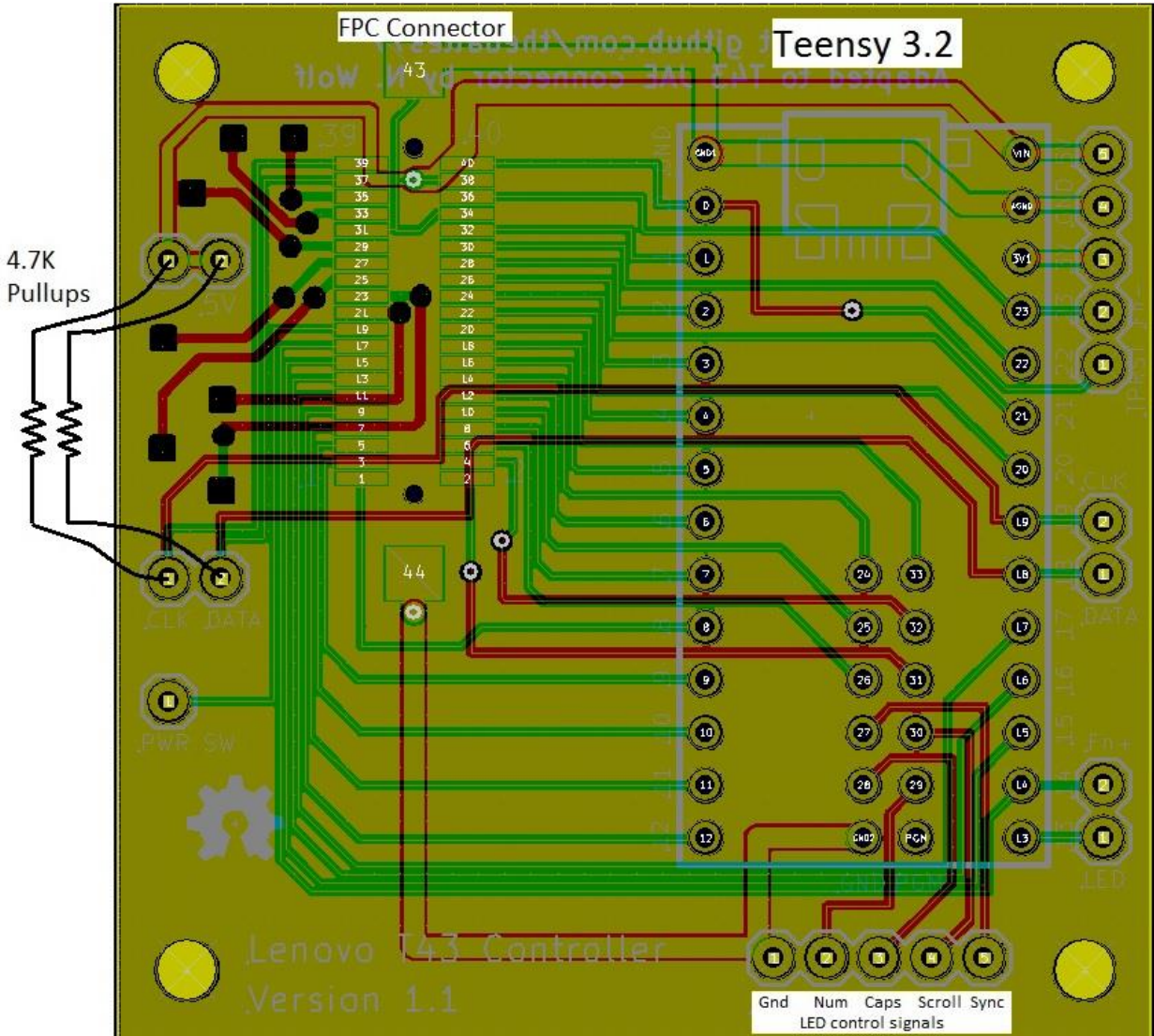


## IBM T43 Keyboard/Trackpoint Conversion to USB by Nathaniel Wolf

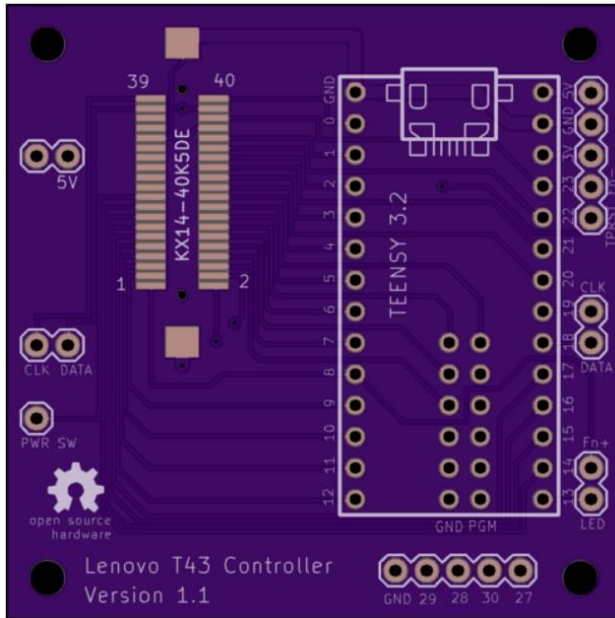
The IBM T43 keyboard is shown connected to a Teensy 3.2 connector board.



The T43.KICAD\_PCB layout shown below uses a Teensy 3.2 and the 40 pin connector unsoldered from the original T43 motherboard using the ChipQuik SMD1 Leaded Low Temperature Removal Kit. Two 4.7K pullups are needed for the trackpoint PS/2 clock and data. The Anode side of the LEDs for Num Lock, Caps Lock, and Scroll Lock can be connected to the pads shown below. Each LED cathode should have a dropping resistor tied to ground to limit the current. Flying leads or right angle headers can be used for Teensy I/O's 24 thru 33 on the backside.



The KiCad file can be sent directly to OSHPark for fabrication and will produce the board shown below.



The completed board with soldered components is shown below.



This table gives the Teensy 3.2 I/O pin numbers translated to the FPC connector pins.

Teensy I/O #	FPC pin #	Signal Name
0	40	Trackpoint Reset
1	32	Keyboard Row
2	28	Keyboard Row
3	24	Keyboard Row
4	20	Keyboard Row
5	16	Keyboard Row
6	12	Keyboard Row
7	8	Keyboard Row
8	1	Hotkey (Fn)
9	3	Keyboard Column
10	5	Keyboard Column
11	7	Keyboard Column
12	9	Keyboard Column
13		Blink LED on Teensy
14	17	Keyboard Column
15	15	Keyboard Column
16	13	Keyboard Column
17	11	Keyboard Column
18	37	Trackpoint Data
19	39	Trackpoint Clock
20	22	Keyboard Row
21	26	Keyboard Row
22	30	Keyboard Row
23	36	Hotkey (Fn return)
24	14	Keyboard Row
25	10	Keyboard Row
26	6	Keyboard Row
27		Debug sync
28		Caps LED
29		Num LED
30		Scroll LED
31	2	Keyboard Row
32	4	Keyboard Row
33	18	Keyboard Row
	38	5 Volts
	19	Power Switch
	31	Ground
	34	Ground

The keyboard matrix is given below with the Teensy 3.2 inputs across the top and Teensy outputs on the side. The Teensy code scans the rows by driving each output row low, one at a time. The other 15 row outputs are left floating so they don't interfere. The Teensy turns on pull ups on the 8 inputs and will read a low if the key is pressed.

Out \ In	14	15	16	12	11	10	9	17
22		<b>cntrl-r</b>				<b>cntrl-l</b>		
1	<b>alt-r</b>		prt_sc	scr-lk			<b>alt-l</b>	
21		<b>shift-r</b>			<b>shift-l</b>			
2	Left	pause	end			Home	Up	
20		Z	1	Q	Tab	back-tick	esc	A
3	Pg-right	Pg-left	pg-down			pg-up		
4	Right		F12			Insert		
5	Down		F11	Vol-up	Vol-down	Del	Access	Mute
6	/		0	P	[	minus	quote	;
24		C	3	E	F3	F2	F4	D
7		Period	9	O	F7	F8		L
25	B	V	4	R	T	5	G	F
33		X	2	W	Caps	F1		S
26	Space	Enter	F10		bckspc	F9	F5	\
32		Comma	8	I	]	equal	F6	K
31	N	M	7	U	Y	6	H	J

I/O 23 is Fn output (always driven low)

I/O 8 is Fn Input

The Fn (Hotkey) has its own dedicated pins, not shared with any other keys.

This matrix has been coded into the Arduino file "IBM\_T43\_KBandTP.ino"

Select Tools, Board: Teensy 3.2 and USB Type: Keyboard+Mouse+Joystick.